

## Supplementary Materials

### Synthesis of four-armed triphenylamine-based molecules and their applications in organic solar cells

Tao Jia<sup>1</sup>, Zuosheng Peng<sup>2</sup>, Qi Li<sup>1</sup>, Tao Zhu<sup>1</sup>, Qiong Hou<sup>1,3\*</sup>, Lintao Hou<sup>2,3\*</sup>

<sup>1</sup>School of Chemistry & Environment, South China Normal University, Guangzhou 510006, China

<sup>2</sup>Siyuan Laboratory, Department of Physics, Jinan University, Guangzhou 510632, China

<sup>3</sup>State Key Laboratory of Luminescent Materials and Devices, South China University of Technology, Guangzhou 510641, China

Correspondence to: Qiong Hou (E-mail: houqiong@scnu.edu.cn); Lintao Hou (E-mail: thlt@jnu.edu.cn);

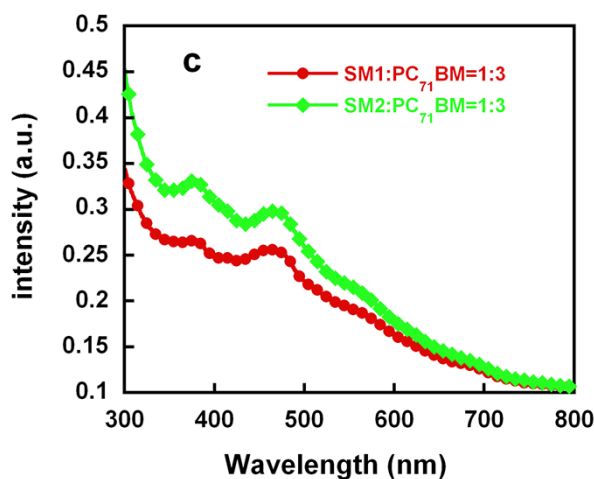


Fig. S1 UV-vis absorption spectra of small molecule/PC<sub>71</sub>BM (1:3, w/w) blend film (non-normalized)

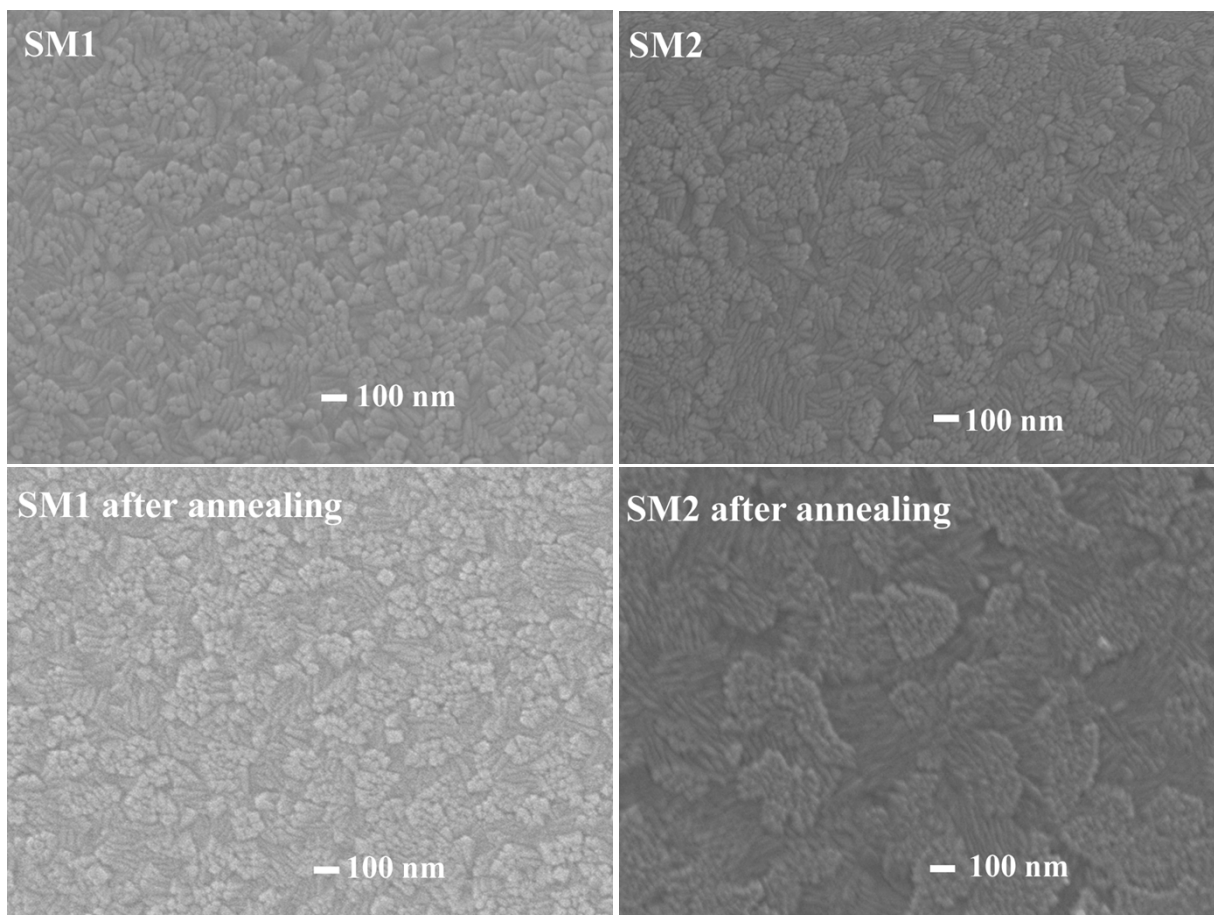


Fig. S2 SEM micrographs of SM1/PC<sub>71</sub>BM (1:3, w/w) and SM2/PC<sub>71</sub>BM (1:3, w/w) (15KV, ×50000)

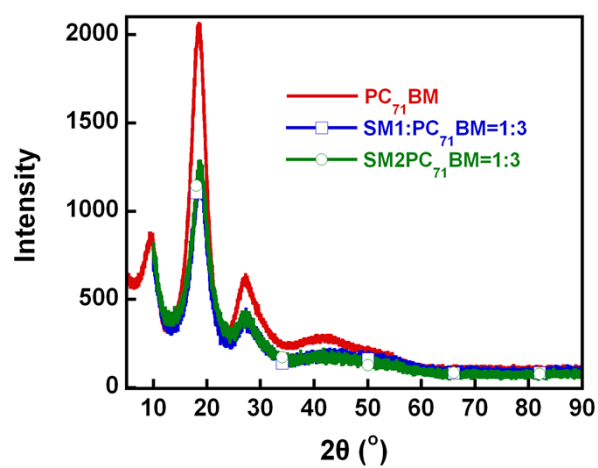


Fig. S3 WAXD patterns of PC<sub>71</sub>BM, SM1/PC<sub>71</sub>BM blend and SM2/PC<sub>71</sub>BM blend (1:3, w/w)

**Table S1** The average values and errors of  $J_{sc}$ ,  $V_{oc}$ , FF and PCE for OSCs based on SM1 and SM2 donors

Small molecules	Donor:PC <sub>71</sub> BM (weight ratios)	$J_{sc}$ /mA cm <sup>-2</sup>	$V_{oc}$ /V	FF (%)	PCE (%)
SM1	1:2	5.70±0.15	0.81±0.01	29.5±0.05	1.36±0.08
	1:3	6.13±0.15	0.83±0.01	31.5±0.05	1.60±0.05
	1:4	4.90±0.10	0.81±0.01	26.6±0.06	1.06±0.05
	1:3 <sup>a</sup>	3.33±0.16	0.63±0.01	32.2±0.05	0.68±0.05
SM2	1:2	6.30±0.18	0.83±0.01	33.1±0.06	1.73±0.09
	1:3	6.70±0.10	0.85±0.01	35.5±0.05	2.02±0.08
	1:4	5.40±0.16	0.84±0.01	28.3±0.06	1.28±0.09
	1:3 <sup>a</sup>	4.62±0.15	0.60±0.01	33.7±0.05	0.93±0.07

The average values and errors of  $J_{sc}$ ,  $V_{oc}$ , FF and PCE were obtained from twelve cells

<sup>a</sup> Thermal annealing at 120°C for 10 min.